



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/933,492	08/20/2001	David R. Hembree	00-0625.1	6973
22823	7590	05/05/2006	EXAMINER	
STEPHEN A GRATTON THE LAW OFFICE OF STEVE GRATTON 2764 SOUTH BRAUN WAY LAKEWOOD, CO 80228			CHU, CHRIS C	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 05/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/933,492

Applicant(s)

HEMBREE ET AL.

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2006.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 52 - 62 and 70 - 77 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 52 - 62 and 70 - 77 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 20 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Appeal Brief

1. In view of the appeal brief filed on February 6, 2006, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

Ken Parker

A.U. 2815

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following limitation "the conductor having a pattern containing digital data representing locations of the good

Art Unit: 2815

components, the defective component and the component contacts” must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

On page 11 of appeal brief, applicant clearly states under the section of his argument for the objection to the drawing that the reference number 36 in Fig. 3 is referenced for the digital data and the reference number 36 is not the conductors. Furthermore, applicant referenced the conductors as reference number 22. Thus, the limitation “the conductor having a pattern

Art Unit: 2815

containing digital data ..." is not shown in the drawings as specified in the claims. Therefore, the objection to the drawings is proper and the drawing objection is maintained.

Specification

3. The amendment filed August 8, 2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "the conductor having a pattern containing digital data representing locations of the good components, the defective component and the component contacts".

Applicant is required to cancel the new matter in the reply to this Office Action.

Applicant argues that since the original disclosure disclosed the above limitation in page 13, line 22 to page 14, line 9, the new matter objection is submitted to be in error. This argument is not persuasive because the page 13, line 22 to page 14, line 9 of the specification clearly discloses the digital data 36 in Fig. 3 containing the information (i.e., locations of the good components, the defective component, the component contacts, etc.; see page 13, lines 27 – 29) instead of the conductor. Thus, the new matter objection is proper and the specification objection is maintained.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

Art Unit: 2815

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 52, 56, 60 and 70 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

(A) In claims 52, 56, 60 and 70, the specification fails to describe the phrase “the conductor having a pattern containing digital data representing locations of the good components, the defective component and the component contacts”. The final product of this invention clearly shows in Fig. 2J, Fig. 7, Fig. 7A, Fig. 7B and page 12, line 1 – page 13, line 32 that the conductors 22p or 22 are just normal wiring circuits which are formed by etching the redistribution layer 20 according to the data received from the digital data 36. Furthermore, the specification clearly discloses in page 12, lines 8 – 15 that the digital data 36 (i.e., software) contains digital data representing locations of the good components, the defective component and the component contacts not the conductor. Thus, the newly added phrase “the conductor having a pattern containing digital data representing locations of the good components, the defective component and the component contacts” in the claims 52, 56, 60 and 70 are not supported by the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

On page 13, applicant argues “the conductors have a physical structure that is different than conventional wiring on a semiconductor wafer. Specifically, the conductors have an unique pattern containing information in the form of digital data.” This argument is not persuasive. As explained in the previous paragraphs, a simple metal couldn’t contain digital data (i.e., locations of the good components, the defective component, the component contacts, etc.). Second, all of the conductors are formed in same patterns because all of them went through the same process to form on the wafer before the burn-in test for the wafer (see page 14, lines 10 – 21). In other words, every conductors on good and bad components have same unique pattern before and after the burn-in test. The conductors are etched or reformed or stayed according to the information in the digital data 36 to repair the bad component (see page 13, lines 22 – 32 of the original specification.). Thus, the originally patterned conductors as disclosed in the original specification do not have any physically different structures, marks nor contain any digital data. Therefore, the rejection under 35 U.S.C. 112, first paragraph is proper and the rejection is maintained.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 52 – 62 and 70 – 77 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 52, 56, 60 and 70, it is unclear what the applicant regards as:

- (a) Regarding the limitation “a plurality of conductors... in electrical communication with the component contacts configured to redistribute the component contacts on the good components” how is the plurality of conductors configured to redistribute the component contacts on the good components?
- (b) Regarding the limitation “and to repair the defective component by connecting selected component contacts on the defective component with selected integrated circuits on the defective component;” it is not clear how a defective component may be repaired by connecting the defective component with other integrated circuits on the defective component. The limitation states that the component is itself defective, so how can it be repaired by connecting to itself?
- (C) Regarding the limitation “the conductor having a pattern containing digital data representing locations of the good components, the defective component and the component contacts;” it is unclear how the pattern of a conductor contains **digital data** ... when the conductor is nothing more than a metal wire and not software.

On page 14, applicant argues “redistribution conductors are well known to those skilled in the art of semiconductor manufacture.” This argument is not persuasive. First, redistribution layers are well known in the art of semiconductor manufacture and using the redistribution layers to redistribute the conductors are also well known in the art. However, patterned conductors 22 in instant invention are not automatically configured or redistributed by itself according to the electrical communication between the conductors and the component contacts as recited in the

Art Unit: 2815

following limitation “conductors... in electrical communication with the component contacts configured to redistribute the component contacts on the good components” when the patterned conductors are nothing more than mere metal bumps (see Fig. 2F). Although claims are to be read in light of the specification, the language of the claim should be precise, clear, correct, and unambiguous such that a person of ordinary skill in the art could interpret the metes and bounds of the claim so as to understand how to avoid infringement. In this case, the limitations are not precise, clear, correct, and unambiguous. Thus, a person of ordinary skill in the art could not interpret the metes and bounds of the claims. Therefore, the rejection under 35 U.S.C. 112, second paragraph is proper and the rejection is maintained.

Furthermore, applicant states “one skilled in the art of semiconductor manufacture would understand repair of a semiconductor component performed by connecting selected component contacts.” This statement is the perfect example of the rejection under 35 U.S.C. 112, second paragraph for the limitation “and to repair the defective component by connecting selected component contacts on the defective component with selected integrated circuits on the defective component.” Because there are more than one way to repair of a semiconductor component performed by connecting selected component contacts (see Leung, U. S. Pat. No. 4,778,745 or the prior arts in Tanizawa, U. S. Pat. No. 4,721,995, etc.). That is why, the limitation “and to repair the defective component by connecting selected component contacts on the defective component with selected integrated circuits on the defective component” is unclear. How are the selected component contacts selectively connected to the selected integrated circuits on the bad component without using any other extra structure? Although claims are to be read in light of the specification, the language of the claim should be precise, clear, correct, and unambiguous such

Art Unit: 2815

that a person of ordinary skill in the art could interpret the metes and bounds of the claim so as to understand how to avoid infringement. In this case, the limitations are not precise, clear, correct, and unambiguous. Thus, a person of ordinary skill in the art could not interpret the metes and bounds of the claims. Therefore, the limitation is properly rejected in the previous Office action and maintained in this Office action.

Even further, applicant states “it is the pattern of the conductors, and not the conductors themselves that contains the digital data.” This statement clearly shows that the conductors must have more than three different patterns for each digital data to represent locations of the good components, the defective component and the component contacts. However, the limitation “the conductor having a pattern containing digital data representing locations of the good components, the defective component and the component contacts” could read as the conductor having only one pattern that contains digital data representing locations of the good components, the defective component and the component contacts. Thus, the limitation is not clear as explained in the previous Office action and this Office action. Therefore, the rejection for third limitation is maintained.

For the above reasons, the 112 2nd rejection in the previous Office action is proper and the rejection is maintained.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2815

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 52 – 62 and 70 – 77 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanizawa (U. S. Pat. No. 4,721,995).

Regarding claims 52, 60 and 70, as best as understood by the Examiner, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) a semiconductor component comprising:

- a substrate (semiconductor wafer 1 in Fig. 4 and column 4, line 67) comprising a plurality of semiconductor components (semiconductor IC blocks 2; column 5, lines 1 – 15), each component including a plurality of component contacts (4; column 5, line 16) and a plurality of integrated circuits (Integrated circuits in the blocks 2; column 5, lines 16 – 27) in electrical communication (by using the element 112) with the component contacts (4; see Fig. 3(a)), the components including a plurality of good components (good components, i.e., A, B, C and the not hatched block 2 in Fig. 4) and at least one defective component (any hatched block 2, i.e., E; see Fig. 4 and column 5, lines 61 – 62)
- a metal redistribution layer (claim 70; the metal redistribution line 5; column 5, lines 28 – 31) on the substrate (1) comprising a plurality of conductors (6B; column 5, lines 47 and 48) on the components in electrical communication with the component contacts (4; see Fig. 3(b)) configured to redistribute the component contacts on each component (see Fig. 3(b)), to electrically connect the contacts (4) on components (2; see Fig. 3(b)), to either repair, reconfigure, or electrically isolate the defective component, or to electrically connect multiple components in a cluster that excludes

Art Unit: 2815

the defective component (claim 70; see Fig. 3(a), Fig. 6(b), column 5, line 62 – column 6, line 5), and to repair the defective component by connecting selected component contacts on the defective component with selected integrated circuits on the defective component (column 5, line 62 – column 6, line 5), and to reconfigure the component contacts (by redistribution line 5) on the defective component (claim 60; Fig. 3(a), Fig. 6(b), column 5, line 62 – column 6, line 5).

Furthermore, the limitation “the conductor having a pattern containing digital data representing locations of the good components, the defective component and the component contacts” is functional or intended use language that does not differentiate the claimed structure over Tanizawa. Since the term “digital data” is defined as the locations (i.e., the good components, the defective component and the component contacts) and the patterned conductor of Tanizawa also represents the locations (i.e., the good components, the defective component and the component contacts), the patterned conductor of Tanizawa contains the digital data. Thus, Tanizawa meets the claim.

Regarding claim 53, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the components including a second defective component (a second hatched block for the bad blocks 2; column 5, lines 61 and 62) and the conductors (6B) being configured to electrically isolate the second defective component (see e.g., Fig. 6(b) and column 6, lines 25 – 30. since the conductors 6B is electrically connected to the new chip 8 and not electrically connected to the bad chip 2, Tanizawa fully meets this limitation.).

Regarding claim 54, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the components (2) including a second defective component (a second hatched block for the bad

Art Unit: 2815

blocks 2) and the conductors (6B or 11B) being configured to reconfigure the component contacts (4) on the second defective component (see e.g., Fig. 6(b)). Since the contacts 4 on the bad chip 2 are physically attached to the contacts 9 on the good chip 8 thru the good chip 8, the contacts 9 read as reconfigured contacts of the contacts 4. Thus, Tanizawa fully meets this limitation.).

Regarding claim 55, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the components (2) including a second defective component (a second hatched block for the bad blocks 2) and the conductors being configured to electrically connect multiple components in a cluster (wafer level IC) that excludes the second defective component (see e.g., Fig. 6(a) and Fig. 6(b)).

Regarding claim 56, as best as understood by the Examiner, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) a semiconductor component comprising:

- a substrate (semiconductor wafer 1 in Fig. 4) comprising a plurality of components (semiconductor IC blocks 2), a plurality of component contacts (4);
- the components (2) including a plurality of good components (e.g., any one of the good elements 2) and at least one defective component (any hatched block 2, i.e., E; see Fig. 4 and column 5, lines 61 – 62) identified during a component testing process (testing process; column 5, lines 62 – 66);
- a plurality of conductors (6B) on the components configured to redistribute the component contacts (4) on the good components (e.g., any one of the good elements 2) and to electrically isolate the component contacts on the defective component (any hatched block 2, i.e., E; see e.g., Fig. 4) on the substrate during testing of the good

components (see e.g., Fig. 6(b) and column 6, lines 25 – 30. since the conductors 6B is electrically connected to the new chip 8 and not electrically connected to the bad chip 2, Tanizawa fully meets this limitation.).

Furthermore, the limitation “the conductor having a pattern containing digital data representing locations of the good components, the defective component and the component contacts” is functional or intended use language that does not differentiate the claimed structure over Tanizawa. Since the term “digital data” is defined as the locations of the good components, the defective component and the component contacts and the patterned conductor of Tanizawa represents the locations of the good components, the defective component and the component contacts, the patterned conductor of Tanizawa contains the digital data. Thus, Tanizawa meets the claim. Even further, the term “burn-in” testing is a process designation, and would thus not carry patentable weight in this claim drawn to a product. See *In re Thorp*, 227 USPQ 964 (Fed. Cir. 1985).

Regarding claim 57, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) a plurality of terminal contacting (the attaching materials between the elements 6B and 4) on the good components (good 2s, i.e., A – D, etc.) in the selected patterns in electrical communication with the conductors (e.g., 4).

Regarding claim 58, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the conductors (6B) being configured to electrically connect a plurality of good components in a cluster (wafer level IC) that exclude the defective component (see e.g., Figs. 6(a) and 6(b)).

Regarding claim 59, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the substrate (1) comprising a semiconductor wafer (1; column 4, line 67), and the components (2) comprising semiconductor dice or semiconductor packages (die-IC; column 6, lines 51 – 55).

Regarding claim 61, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) a plurality of terminal contacts (the attaching materials between the elements 6B and 4) on the good components (2) in electrical communication with the conductors (6B) and the component contacts (4; see e.g., Figs. 3(a) and 3(b)) on the good components.

Regarding claims 62 and 76, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the substrate (1) comprising a semiconductor wafer (1) or portion thereof and the components (2) comprising a semiconductor dice (die-IC; column 6, lines 51 – 55).

Regarding claim 71, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the good components include a plurality of terminal contacts (the attaching materials between the elements 6B and 4) in electrical communication with the component contacts on the good components (see e.g., Fig. 3(a)).

Regarding claim 72, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the component contacts (4) comprising bond pads (column 5, line 16).

Regarding claim 73, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the conductors (6B) on the good components have a fan out configuration (see e.g., Fig. 3(a)).

Regarding claim 74, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the substrate (1) comprising a semiconductor wafer (column 4, line 67).

Regarding claim 75, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) a protective layer (5; column 5, lines 28 and 29) on the conductors (6B) on the good components.

Regarding claim 77, Tanizawa discloses in e.g., Fig. 3(a), Fig. 3(b), Fig. 4 and Fig. 6(b) the components (2) including a second defective component (the second hatched block 2 in Fig. 4) and the conductors (6B) being configured to electrically isolate the second defective component (column 5, lines 62 – 66).

Response to Arguments

10. Applicant's arguments with respect to claims 52, 56, 60 and 70 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Takahashi et al. discloses a semiconductor IC device.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

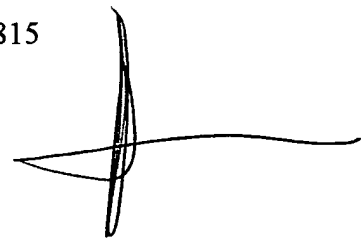
Art Unit: 2815

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
Thursday, April 27, 2006

A handwritten signature in black ink, appearing to read 'KENNETH PARKER', written over a horizontal line.

KENNETH PARKER
SUPERVISOR, PATENT EXAMINER